

**NorCal Engineering**  
Soils and Geotechnical Consultants  
10641 Humbolt Street Los Alamitos, CA 90720  
(562)799-9469 FAX (562)799-9459

March 26, 1998

Project Number 5936-96

Boeing Realty  
4060 Lakewood Boulevard  
Lakewood, California 90808

Attn: Mr. Mario Stavale

RE: **Observation and Testing of Backfill Operations** - Existing Boeing  
Facilities Demolition Project - Located at the Southwest Corner of  
190th Street and Normandie Avenue, in the City of Los Angeles,  
California

Dear Mr. Stavale:

Pursuant to your request, this firm has observed and tested backfill operations at the above referenced project. The results of the compaction tests are attached and locations of these tests are shown on the accompanying Site Plan. All work was performed in accordance with all present day standards of the Geotechnical Engineering Industry.

**Backfill Operations**

The fill area consisted of an excavation approximately 60 feet by 45 feet with a maximum depth of 10 feet below ground surface. The excavation was removed of all demolition debris and low density soils to expose competent native soils. The excavation bottom was observed and approved by this firm prior to placement of fill.

Fill soils placed were compacted to a minimum of 90% of the laboratory standard in lifts not in excess of eight inches in thickness. The maximum depth of fill placed was 10 feet. A sheepsfoot steel wheel roller (Bomag) was utilized for compaction control. A water hose provided moisture control. The approximate limits of compacted fill are indicated on the attached Site Plan.

### **Field/Laboratory Testing**

The relative compaction was determined by Sand Cone Method (ASTM: D-1556-82) and by the Drive Tube Method (ASTM: D-2937). The maximum density of the fill soils was obtained by the laboratory standard (ASTM: D-1557-78) and results are shown on Table I. Tests were performed a minimum of every 500 cubic yards placed and every two feet in depth of fill placed. Results of field density tests are presented in Table II. No chemical analysis was performed by NorCal Engineering on the excavation nor the backfill soils.

### **Conclusions**

The geotechnical engineering aspects of the backfill operations have been observed and are in compliance with the applicable conditions of the grading permits and the geotechnical engineer's recommendations. The backfill meets secondary fill requirements for support of pavement and floor slab. The excavation has been backfilled to the approval of this firm and is suitable for its intended use.

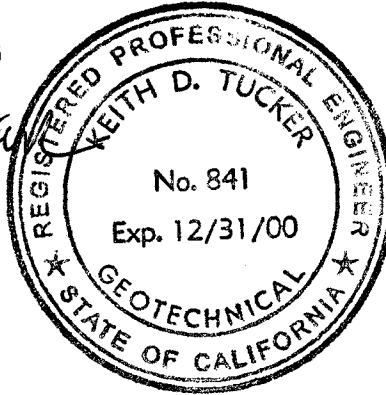
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We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,  
NORCAL ENGINEERING

*Keith D. Tucker*

Keith D. Tucker  
Project Engineer  
R.G.E. 841



*Mark Burkholder*

Mark Burkholder  
Project Manager

NorCal Engineering

**TABLE I**  
**MAXIMUM DENSITY TESTS**  
**(ASTM: D-1557-78)**

<u>Soil Type</u>	<u>Classification</u>	<u>Optimum Moisture</u>	<u>Maximum Dry Density (lbs./cu.ft.)</u>
I	Silty, sandy clay	17.0	118.0
II	Silty, sandy, clay with gravel	13.0	124.0
III	Silty, sandy clay with gravel	11.0	128.0

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**TABLE II**  
**SUMMARY OF COMPACTION TEST RESULTS**

<u>Date of Test</u>	<u>Test No.</u>	<u>Elevation</u>	<u>Percent Moisture</u>	<u>Unit Wt. lbs./cu.ft.</u>	<u>Relative Compaction</u>	<u>Soil Type</u>
3/18/98	101	10.0-10.5	19.6	107.9	91	I
3/18/98	102	8.0-8.5	22.2	102.3	82	II
3/20/98	102A	8.0-8.5	14.8	113.2	91	II
3/20/98	103	7.0-7.5	12.6	118.5	93	III
3/20/98	104	6.0-6.5	12.5	120.3	94	III
3/23/98	105	4.0-4.5	15.8	118.3	95	II
3/23/98	106	4.0-4.5	14.7	115.9	94	II
3/23/98	107	3.0-3.5	14.6	116.1	94	II
3/23/98	108	2.0-2.5	10.0	121.8	95	III
3/24/98	109	1.0-1.5	14.6	120.4	97	II
3/24/98	110	0.0-0.5	12.1	121.9	95	III

\*Depth below finished grade

\*\*Retest of failing tests after area reworked

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**CITY OF LOS ANGELES**  
**DEPARTMENT OF BUILDING AND SAFETY**  
**ENGINEER'S CERTIFICATE OF COMPLIANCE FOR COMPACTED EARTH FILLS**

JOB/LEGAL ADDRESS: Normandie and 190th, Los Angeles

SOIL TESTING AGENCY: NorCal Engineering

PROPERTY OWNER'S: NAME: Boeing Realty

OWNER'S ADDRESS: 4060 Lakewood Blvd., Lakewood

PER REPORTS ON OUR PROJECT NUMBER: 5936-96

DATE OF WORK STARTED ON PROJECT: 3/18/98

DATE FILL WAS COMPLETED: 3/24/98

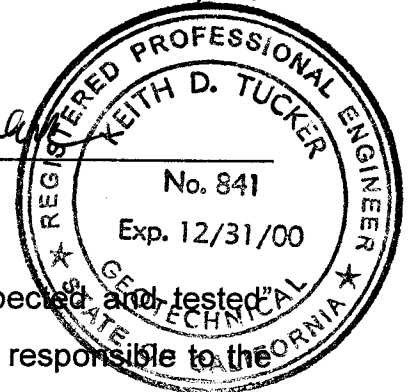
DATE OF THIS CERTIFICATE: 3/25/98

**TO THE SUPERINTENDENT OF BUILDING:**

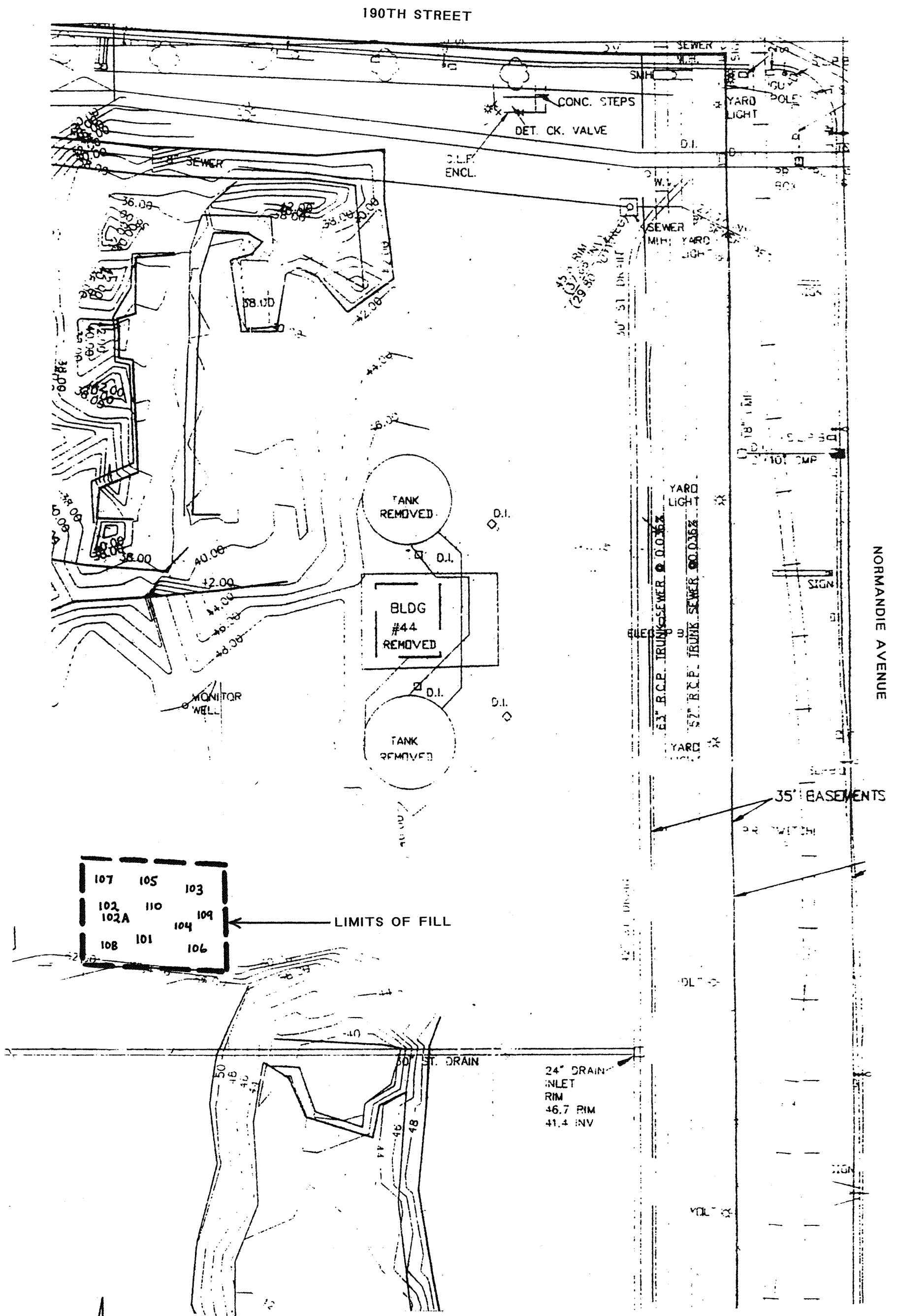
I hereby certify that I have personally inspected and tested the placing of compacted earth fill on the above described property, and on the basis of these inspections and tests it is my opinion that the same was placed in conformity with the requirements of the Los Angeles City Building Code.

*Keith D. Tucker*

Keith D. Tucker  
R.G.E. 841



\*For the purpose of this certificate, to have "personally inspected and tested" shall include inspection and testing performed by any person responsible to the licensed engineer signing this certificate. Where the inspection and testing of all or part of the work above is delegated, full responsibility shall be assumed by the licensed engineer whose signature is affixed thereon.



<b>NorCal Engineering</b>	
SOILS AND GEOTECHNICAL CONSULTANTS	
BOEING REALTY	
PROJECT 5936-96	DATE APRIL 1998

LOCATION OF COMPACTION TESTS